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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,596	12/09/2003	Bijan Sayyarrodsari	5650-03600	4732

7590 05/01/2006		EXAMINER
JEFFREY C. HOOD		PHAM, THOMAS K
MEYERTONS, HOOD,KIVLIN, KOWERT & GOETZEL PC		
P.O. BOX 398	ART UNIT	PAPER NUMBER
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DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>09 December 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-34</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-13 and 16-30</u> is/are rejected.

7)☒ Claim(s) <u>14,15 and 31-34</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>09 December 2003</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All   b)☐ Some * c)☐ None of:

       1.☐ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____.

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

First Action on the Merits

1.   Claims 1-34 of U.S. Application 10/731,596 filed on 12/09/2003 are presented for

examination.

Quotations of U.S. Code Title 35

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Preliminary Amendment

6.   The preliminary amendment filed 03/15/2006 for inserting a reference to the prior application as the first sentence(s) of the specification has been considered and entered for this application.

Drawings

7.   New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because figures 1-4 and 8-11 are not clearly show the lines and detail. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

8.   Claims 1-13 and 18-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,278,899 ("Piche").

Regarding claim 1

Piche teaches a system for controlling a plant, comprising:

a distributed control system that further comprises:

- a computing device operable to execute a first software tool that identifies variable inputs and controlled variables associated with the plant, wherein at least one variable input is a manipulated variable input (see Col. 38 lines 1-17),

- and wherein said first software tool is further operable to determine relationships between said variable inputs and said controlled variables (see Col. 6 lines 57-60); and

- at least one input/output controller operable to monitor said variable inputs and tune said manipulated variable to achieve a desired controlled variable value (see Col. 16 lines 13-19).

Piche does not specifically teach the plant is a particle accelerator. "Official Notice" is taken for both the concept and advantages of a system for controlling a plant, wherein the plant is a particle accelerator is well known and expected in the art. U.S. Patent No. 4,329,654 to Chamberlain an automatic control system for driving a particle accelerator (see Col. 1 lines 15-17, Col. 2 line 55 to Col. 3 line 11). It would be obvious to one of ordinary skill in the art to apply the distributed control system of Piche to a plant such as the particle accelerator of Chamberlain for producing a maximum particle output from the accelerator.

Regarding claim 18

Piche teaches a method for controlling a plant, comprising the steps of:

- identifying variable inputs and controlled variables associated with the particle accelerator, wherein at least one variable input parameter is a manipulated variable (see Col. 38 lines 1-17);

- determining relationships between said variable inputs and said controlled variables wherein said relationship comprises models, and wherein parameters within said model are dependent on said variable inputs (see Col. 6 lines 57-60); and

- tuning said manipulated variable to achieve a desired controlled variable value (see Col. 16 lines 13-19).

Piche does not specifically teach the plant is a particle accelerator. "Official Notice" is taken for both the concept and advantages of a system for controlling a plant, wherein the plant is a particle accelerator is well known and expected in the art. U.S. Patent No. 4,329,654 to Chamberlain an automatic control system for driving a particle accelerator (see Col. 1 lines 15-17, Col. 2 line 55 to Col. 3 line 11). It would be obvious to one of ordinary skill in the art to apply the distributed control system of Piche to a plant such as the particle accelerator of Chamberlain for producing a maximum particle output from the accelerator.

Regarding claim 2

Piche teaches wherein said relationships between said variable input parameters and said controlled variables comprises a first principle models (see Col. 22 lines 36-40) wherein said first principle model is dependent on said variable inputs (see Col. 23 lines 12-16 and 27-30).

Regarding claim 3

Piche teaches neural networks utilized to identify said variable inputs (see Col. 6 lines 54-57).

Regarding claims 4 and 22

Piche teaches wherein said step of determining relationships between said variable inputs and said controlled variables utilizes a combination of physical models and empirical methods (see Col. 45 lines 56-63).

Regarding claims 5 and 23

Piche teaches wherein said physical models and empirical methods are combined in series (see FIG. 28 shows prior art combine the models in series).

Regarding claims 6 and 24

Piche teaches wherein said physical models and empirical methods are combined in parallel (see

FIG. 2 shows dynamic model (physical) 22 in parallel with steady-state model (empirical) 20).

Regarding claims 7 and 25

Piche teaches wherein said physical model varies over an operating range (see Col. 21 lines 10-

22).

Regarding claims 8 and 26

Piche teaches wherein said physical model is a function of said variable inputs (see Col. 10 lines

14-22).

Regarding claims 9 and 27

Piche teaches wherein said physical model comprises first principle parameters which vary with

said variable inputs, wherein empirical methods comprise a neural network used to identify first

principle parameters values associated with said variable inputs, and wherein said neural network

updates said first principle parameters with values associated with said variable inputs (see Col.

23 lines 10-35).

Regarding claims 10 and 28

Piche teaches wherein said neural network is trained (see Col. 7 lines 3-5).

Regarding claims 11 and 29

Piche teaches wherein said neural network is trained according to at least one method selected

from the group consisting of: gradient methods (see Col. 15 line 24), back propagation (see Col.

3 lines 10-11), gradient-based nonlinear programming methods (see Col. 30 lines 27-28),

sequential quadratic programming (see Col. 11 lines 49-52), generalized reduced gradient

methods (see Col. 29 lines 50-65), and non-gradient methods (see Col. 3 lines 12-13).

Regarding claims 12 and 30

Piche teaches wherein gradient methods require gradients of an error with respect to a weight

and bias obtained by numerical derivatives (see Col. 29 lines 55-57).

Regarding claim 13

Piche teaches wherein gradient methods require gradients of an error with respect to a weight

and bias obtained by analytical derivatives (see Col. 7 lines 3-5).

Regarding claim 19

Piche teaches wherein said step of identifying parameters utilizes neural networks to identify

said parameters (see Col. 6 lines 54-57).

Regarding claim 20

Piche teaches wherein said step of identifying parameters utilizes neural networks that identify

said parameters when an operating region changes (see Col. 6 lines 54-57).

9.   Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Patent No. 5,933,345 ("Martin").

Regarding claim 16

Martin teaches a dynamic controller predicting a change in the dynamic variable input values to

a process to effect a change in the output of the process from a current output value at a first time

to a different and desired output value at a second time, comprising:

-   a dynamic predictive model for receiving the current variable input value (see Col. 9 lines

    13-14), wherein said dynamic predictive model changes dependent upon said input value,

    and the desired output value (see Col. 9 lines 31-38),

- and wherein said dynamic predictive model produces a plurality of desired controlled variable values at different time positions between the first time and the second time to define a dynamic operation path of the particle accelerator between the current output value and the desired output value at the second time (see Col. 2 lines 55-61); and

- an optimizer for optimizing the operation of the dynamic controller over a plurality of the different time positions in accordance with a predetermined optimization method that optimizes the objectives of the dynamic controller to achieve a desired path, such that the objectives of the dynamic predictive model vary as a function of time (see Col. 2 lines 61-67).

Martin does not specifically teach the plant is a particle accelerator. "Official Notice" is taken for both the concept and advantages of a system for controlling a plant, wherein the plant is a particle accelerator is well known and expected in the art. U.S. Patent No. 4,329,654 to Chamberlain an automatic control system for driving a particle accelerator (see Col. 1 lines 15-17, Col. 2 line 55 to Col. 3 line 11). It would be obvious to one of ordinary skill in the art to apply the distributed control system of Piche to a plant such as the particle accelerator of Chamberlain for producing a maximum particle output from the accelerator to achieve more efficient collisions between particles.

Regarding claim 17

Martin teaches wherein said dynamic predictive model comprises:

- a dynamic forward model operable to receive variable input values at each of said time positions and map said variable input values to components of said dynamic predictive

model associated with said received variable input values in order to provide a predicted

dynamic output value (see Col. 3 lines 1-5);

- an error generator for comparing the predicted dynamic output value to the desired output

  value and generating a primary error value as the difference for each of said time

  positions (see Col. 3 lines 5-9);

- an error minimization device for determining a change in the variable input value to

  minimize the primary error value output by said error generator (see Col. 3 lines 9-11);

- a summation device for summing said determined variable input change value with an

  original variable input value, which original variable input value comprises the variable

  input value before the determined change therein, for a plurality of time position to

  provide a future variable input value as a summed variable input value (see Col. 3 lines

  11-14); and

- a controller for controlling the operation of said error minimization device to operate

  under control of said optimizer to minimize said primary error value in accordance with

  said optimization method (see Col. 3 lines 14-17).

Allowable Subject Matter

10.   Claims 14, 15 and 31-34 are objected to as being dependent upon a rejected base claim,

but would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner *Thomas Pham*; whose telephone number is (571) 272-3689, Monday - Thursday from 6:30 AM - 5:00 PM EST or contact Supervisor *Mr. Anthony Knight* at (571) 272-3687.

Any response to this office action should be mailed to: **Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.** Responses may also be faxed to the **official fax number (571) 273-8300.**

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas Pham
Patent Examiner

April 26, 2006